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OBSERVATIONS
UPON
FIRE,

WITH A VIEW TO THE BEST AND MOST EXPEDITIOUS METHODS OF EXTINGUISHING IT,

UPON A NEW PLAN,

WITH OR WITHOUT WATER.

By DAVID YOUNG.

K

Nam tua res agitur, paries cum proximus ardet.

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TO

GEORGE DEMPSTER, Eſq;

OF DUNNICHEN, M. P.

SECRETARY TO THE MOST NOBLE ORDER OF THE THISTLE,

THE FOLLOWING TREATISE IS INSCRIBED,

AS A SMALL TESTIMONY OF RESPECT,

FOR HIS

PUBLIC SPIRIT AND DISINTERESTED PATRIOTISM,

AS WELL AS OF

GRATITUDE FOR MANY FAVOURS RECEIVED

BY

HIS MUCH OBLIGED,

AND

MOST HUMBLE SERVANT,

DAVID YOUNG.

OBSERVATIONS UPON FIRE, &c.

INTRODUCTION.

THE great object of Society, is the mutual advantage and aſſiſtance which men derive from one another; it is the duty, therefore, of every individual, as far as it lies in his power, to promote the happineſs, and provide for the ſafety of his fellow creatures; and it is particularly incumbent upon every one to communicate whatever ſcheme obſervation or experience may have ſuggeſted, by which the numerous evils, to which men are liable, may be alleviated or removed. The Author of theſe ſheets has often ſeen and heard, with regret, of the many calamities which daily happen to mankind by fire; and, with equal regret, has obſerved, that hitherto no effectual means have been found either entirely to prevent them, or effectually to ſtop their progreſs when they happen. A ſubject of ſo much importance demanded an abler pen, and the Author would have been happy had he been prevented from appearing in public, by ſome perſon better qualified for the taſk; but as hitherto no attempt of this kind hath appeared, he hopes that the candid Public will excuſe him, if he ſubmits to their conſideration his own obſervations, rude and inelegant as they may be, upon a ſubject in which every individual is ſo much intereſted.

In treating upon this ſubject, the Author finds it neceſſary to combat a very general prejudice, *viz.* That water is the only means which can be ſucceſsfully employed in extinguiſhing fire: It is perhaps owing to this prejudice, that no attempts have ever been made to ſtop the progreſs of fire by any other method; and ingenious men, inſtead of looking for a better, have employed their thoughts only in inventing engines by which water may be moſt efficaciouſly applied. Bold as the aſſertion may be thought, the Author of this Treatiſe maintains, that it is altogether a popular prejudice, that water is the moſt effectual means of extinguiſhing fire; and ſhould he do no more than convince his countrymen of this truth, he would think himſelf fortunate; as by turning the attention of ingenious men to other methods, ſome one might at laſt be fallen upon, effectually to guard againſt, and prevent its ravages. In the courſe of his experience, circumſtances have occurred, which have convinced him, and which, he hopes, will tend to convince the world, that other means than water may be uſed with effect; and though he may not be able to eſtabliſh an accurate plan by which fire may be extinguiſhed, yet ſtill, he flatters himſelf that he will be able to point out ſome methods by which this end may be more eaſily gained, than by thoſe preſently in practice.

Were people in general once convinced, that many things beſides water may be uſed for this purpoſe, it would naturally occur to every one to make uſe of what they had neareſt at hand; and as it is impoſſible to lay down a ſcheme that will anſwer in every caſe, the following hints are only intended to remind thoſe concerned, to make uſe of ſuch materials as they have, as circumſtances occur, and Providence directs.

The methods here propoſed are ſo ſimple, that it is a matter of wonder they have hitherto been overlooked. But let not their ſimplicity be urged againſt them: Let their efficacy and utility be determined by experience.

As the inferior claſſes of people chiefly are employed in extinguiſhing fire, it is to them this Treatiſe is principally directed, and therefore the Author ſhall endeavour to make his ideas as obvious as poſſible; and, as writing is not his profeſſion, he hopes any innaccuracy in ſtyle and language will paſs without criticiſm.

It is a common ſaying, That Fire is a good Servant, but a terrible Maſter; and that a little Spark often occaſions much Work: Therefore perſons who are employed about fire, had need to be much on their guard, both by night and day, againſt its attacks: But notwithſtanding the greateſt caution, accidental fires will happen; and our gratitude is due to a kind Providence, that they are not more numerous and fatal. When ſuch fires break out, it is the duty of every perſon to exert himſelf to the utmoſt in extinguiſhing them: And people, upon theſe occaſions, are in general ſufficiently active; but, owing to the confuſion into which they are thrown, they often do more harm than good. In ſuch caſes, it is of great importance to be calm and deliberate; for as he is the beſt general who preſerves the greateſt coolneſs in time of action, ſo it is with regard to him who is a director in the time of a fire; the more cool and deliberate, the more ſucceſsful he will be. Owing to confuſion and hurry, many blunders are committed, which might have been prevented, had ſome ſimple means been uſed to extinguiſh the fire at its beginning. Inſtead of acting with vigour, how often do we ſee people ſtanding ſtill, crying for water when it is not to be got, while, in the mean time, the fire is making ſuch rapid progreſs, that, when the water comes, it makes very little impreſſion; for, unleſs there be as much water as will maſter the fire, it only cauſes it to ſpread and burn with the greater fury.

To prevent ſuch confuſion on the one hand, and inactivity on the other, is the intention of this Treatiſe; and, for the greater perſpicuity, the Author will arrange his thoughts under the five following obſervations.

1ſt, He ſhall endeavour to ſhow, that as fire will not burn without air, ſo one moſt effectual method for extinguiſhing it is the excluſion of air.

2dly, Fire will not continue to burn without fuel, (or rather fuel is the ſtrength and feeder of fire); therefore take away fuel, and the fire goes out of itſelf.

3dly, When fire has once begun to burn with violence, confining it tends to make it ſpread and burn with the greater rapidity.

4thly, A great body of fire burns with much more fury than a ſmall; or, in other words, the rapidity of the fire is in proportion to the ſize of its body, degree of its confinement, and the quality of the fuel.

5thly, The more a fire can be divided, the more eaſily may it be checked and extinguiſhed.

After illuſtrating theſe obſervations, the Treatiſe will conclude with giving ſome directions to the perſons employed in extinguiſhing fire.

SECTION I.

In this ſection I ſhall endeavour to ſhow, that as fire will not burn without air, ſo that method will be the beſt for extinguiſhing it which moſt effectually excludes the air.

As this Treatiſe, as formerly mentioned, is not intended for philoſophers, it is needleſs here to enter into a diſcuſſion of the cauſes why fire will not burn without air.

I ſhall only mention ſome ſimple experiments known to moſt people, which effectually prove, that, by the excluſion of air, fire is extinguiſhed; and were once perſons convinced of this, many methods might occur, which it is not poſſible to mention, but which might be uſeful when a fire happens to break out. At its firſt appearance, then is the time in which an extinguiſher will be of moſt ſervice; afterwards it is much more difficult to apply it with effect; yet the ſame means may be ſtill uſed, although not with the ſame ſucceſs as at firſt.

Whatever ſmothers the fire, will anſwer the purpoſe of an extinguiſher.

A cooper, when burning the inſide of a barrel with ſhavings, ſo ſoon as he thinks the barrel fired enough, while it is yet all in a flame, turns it with the mouth downwards on the ground; and, if the ground is level, the fire is immediately extinguiſhed. This ſhows, that a barrel or tub of any kind may ſucceſsfully be applied at firſt, providing the ſame will take in all the fire.

Wet cloths, or even dry, when there is no time to get water, ſuch as blankets, ſheets, carpets, or canvas, if uſed in time, will ſmother a fire. In theſe caſes, they ought to be hard preſſed.

When a vent in a room is on fire, applying wet ſheets or blankets, or the ſmoke-board, cloſe to the under part of the vent, will inſtantly put it out. This hath been often tried with ſucceſs.

Sometimes perſons will ſtop up the upper part of the vent, which likewiſe puts it out, but is more apt to drive down the ſmoke, and likewiſe the fire into the room.

This, therefore, is the great object to which I would call the attention of mankind, that ſo ſoon as a fire takes place, endeavours ought to be uſed to extinguiſh it in its infancy, by ſmothering it, and ſhutting out the air. For this purpoſe, let them not be offended, if I direct them to apply means the moſt ſimple, as earth, lime, ſand, or rubbiſh of any kind, ſtones, bricks, or even ſtraw or hay ſoaked in water. The two laſt in particular, when a fire appears firſt, will be of far more ſervice, than throwing on the water by itſelf, provided you have a ſufficient quantity of ſtraw or hay to ſmother the fire effectually. A ſmall quantity will ſerve, if you keep throwing water above it. This is only to be uſed when no other thing can be had; and only at the beginning of a fire.

It is ſurpriſing to ſee what powerful effects wet ſtraw or hay have on a fire when applied at firſt. They will indeed put it out ſooner than water alone, for the water runs off; but the ſtraw or hay, when once wet, will not burn till they are dry, which ought to be prevented by throwing water upon them. The ſtraw or hay keeps the water from running off; and thus, if the quantity be moderately large, extinguiſhes the fire altogether, by excluding the air. Nor need the quantity of either be very great; too much ſtraw will rather do hurt, as it will keep the water from reaching the fire.

This method of wet ſtraw will anſwer very well in the country. And horſe-dung may be uſed, if ſtraw cannot be got ſo ſuddenly as the caſe requires. Thus, when a corn yard is on fire, take the wet ſtraw, and mix as much earth with it as poſſible; this will prevent the fire from catching hold of the other ſtacks, and if there be water enough, will extinguiſh the fire altogether. If water cannot be had, uſe plenty of earth above the ſtraw, which will anſwer even better than water. A very ſmall quantity of water above

bove the earth will be of great ſervice, if it can be procured. Wet ſtraw, hay or dung might ſometimes be of uſe at taverns or inns; and in any other place, where there is plenty of water or earth, to be uſed as above. In a country place, there is ſeldom or never a ſcarcity of earth; but in great towns, where earth cannot eaſily be got, why not drive it in carts from ſome diſtant place, or dig ſome holes in the ſtreet for earth, which can be filled up in a day or two, with the rubbiſh from the fire?

It is ſurpriſing how ſmall a quantity of earth will ſmother a fire; and it is alſo no leſs ſurpriſing, that moſt perſons never think of applying earth by itſelf, or mixed with water. Let any one try upon a large kitchen fire, a quart of water, and a quart of earth, and he will ſoon be ſenſible that the earth has the moſt effect upon the fire; and, if continued to be thrown, will totally extinguiſh it.

When a fire firſt appears, if nothing elſe can be got, a quantity of ſmall coal, ſuch as Newcaſtle, well wetted, will damp the fire, and a large quantity will extinguiſh it altogether, when the fire has no air below; for wet coals will not burn, when the air is excluded from above and below. In that caſe, the coals will have the ſame effect as earth to exclude the air. Still, however, it is proper to uſe as much water as poſſible above the coals. Coals, however, are not to be uſed when any thing elſe can be got; I only mention them, as ſometimes a perſon may have ſmall coal at hand, when nothing elſe is by him, as at ſea; and ſmall coal, when wet, will not take fire for ſome time. This, at any rate, might prevent the fire from ſpreading inſtantly. Uſing water, therefore, with earth, lime, ſand, horſe-dung, rubbiſh, ſmall coal, hay or ſtraw, has much more effect than uſing water by itſelf, for the water by itſelf runs off, but in this manner a ſmall quantity of it will have the effect to extinguiſh the fire almoſt inſtantly, by excluding the air. I once knew a houſe where the fire had been uſed on the hearth, by ſome ſoldiers quartered there in the year 1745. A number of years after, having occaſion to lift the hearth, I was much ſurpriſed to ſee the whole wood under the ſtone burnt to a charcoal, but which did not go into flame for want of air, otherwiſe the houſe might have been deſtroyed. This reminds me of the method for making charcoal of wood or coal, which is done by ſmothering the fire with earth, after the wood or coal has burnt a conſiderable time, and juſt when the fire is in its utmoſt ſtrength. May not this ſhow the method that ought to be taken with a great fire in a houſe? For can there be any thing more ſtriking than this, when 20 or 30 tuns of coals, or a large quantity of wood, burning in one body, are inſtantly ſmothered with earth, when the fire is in its greateſt ſtrength? If we were but to reflect with attention on what we often ſee in common life, we might learn many uſeful leſſons.

The ſimpler the method, it is often the more effectual, although it be deſpiſed and neglected, becauſe got at an eaſy rate; whereas, were one to recommend a method attended with great expence and trouble, this would be paid more regard to.

A fire ſometimes happens in a cloſe room or cloſet, when plaiſtered all round, where it will continue burning for a long time, till once it breaks into the next room. When that is the caſe, it were better not to open the door, till ſuch time as perſons have ſomething at hand to ſmother the fire; for whenever the air gets in, it makes it ſpread and burn with greater fury. I have ſeen ſome inſtances of perſons opening doors in the next houſe, which made the fire enter inſtantly; whereas, were the doors kept ſhut, it would be ſome time before it made its entrance.

When a perſon ſtands too near a fire, ſometimes his clothes will take fire. In ſuch a caſe, the beſt method is to wrap the perſon in a ſheet or blanket, wet or dry, very cloſe and hard, which will ſmother the fire; or the perſon himſelf may attempt the ſame, if he can; and if nothing is at hand, he ought to throw himſelf upon the ground, and roll backwards and forwards.

I have uſed the following method to extract the foul air out of a deep well, wherein a perſon could not live half a minute: I took a braſs or copper pan, and filling it full of ſhavings of wood, tied a rope to it, and then ſet fire to the ſhavings. The pan was then let down into the well; and as ſoon as the fire got into the foul air, the flame went out. Then pulling the pan up into the thin air, the ſhavings began to burn again. I then let the pan down a ſecond time into the foul air, and continued this method of alternately pulling the pan up, and letting it down, till ſuch time as the fire would burn at the ſurface of the water.

Whether therefore we view the methods I have now mentioned, as conducive of themſelves to ſmother and extinguiſh the fire, or as means for the more effectually applying and tranſmitting the water commonly uſed in ſuch caſes, ſtill the concluſion is the ſame; and I flatter myſelf, that experience will ſoon teach my fellow-citizens, that applications ſuch as theſe will render the calamities of fire leſs dreadful and alarming.

When I thus ſpeak, I ſpeak not altogether without experience: I myſelf have had occaſion to make the trial; and the ſucceſs was equal to the opinion that I entertained. Some years ago, when I was ſitting at dinner, a ſervant came and told me, that a ſummer-houſe I had in my garden was on fire, where he was drying a large parcel of undreſſed flax. As I had often thought that fire might be extinguiſhed without water, I reſolved on taking this opportunity to put it to trial; and the more ſo, as the houſe was by itſelf, and no perſon could ſuffer but myſelf, and the loſs, in any event, could not be great. Therefore I deſired the ſervant not to ſpeak a word to any of the others (of whom I had then fourteen employed hard by), and went into the garden with this ſervant alone, and locked the door behind us. When I went to the door of the ſummer-houſe, the flame was coming out both at the doors and windows. Although there was a ſmall river within twenty yards of the back-door of the garden, I went to work to extinguiſh the fire in the method I had often thought upon, without uſing a drop of water; and in about fifteen minutes, not only extinguiſhed the fire, but alſo the ſmoke, ſo that we went into the houſe as if there had been no fire there. This was done ſo effectually, that though one half of the beet or bundle of flax was wholly burnt, the other half remained quite ſafe. All this was done by throwing on ſome horſe-dung that was lying next the ſummer-houſe door, upon ſome artichokes, with a mixture of ſome earth above. Ever ſince that time, I have been more and more convinced, that fire might be extinguiſhed without water; yet this does not hinder perſons, if they chuſe, from making uſe of water along with earth, horſe-dung or ſtraw, or water by itſelf; only if both be tried it will ſoon appear which is beſt.

This may likewiſe ſhow, that a very few hands going deliberately and reſolutely to work, will do much more execution in extinguiſhing fire than a great number confuſed, not knowing what they are about, the one half only hindering the other, which is often the caſe when a fire happens. If I had taken my fourteen men into the garden, it is a queſtion if they would have extinguiſhed the fire in ſo ſhort a time, and ſo effectually.

Thus we have ſeen the power which

even wet ſtraw or horſe-dung has in quenching a flame; it therefore follows of conſequence, that whatever applications we can make, which may have the effect of excluding the air, and thereby ſmothering the flame, will undoubtedly extinguiſh the fire.

SECTION II.

THE *ſecond* obſervation was, that as fire will not burn without fuel, (or rather fuel is the ſtrength and feeder of the fire), take away the fuel and the fire goes out of itſelf.

Although this obſervation is quite common, and known to every perſon, yet it has a ſtrong connection with what goes before and comes after. It is chiefly meant to put perſons in mind, that there are many things in a houſe that they think it not worth their while to remove, ſuch as partitions and preſſes, which ought, if poſſible, to be removed, and thrown out at the windows. That fuel which is of the moſt inflamable nature, or that which the fire catches hold of inſtantaneouſly is the moſt dangerous; ſuch as gun-powder, ſpirits, oils of all kinds, flax, hemp, and dry wood. All theſe are very eaſily inflamed by fire, and burn with rapidity and great violence, but are ſoon over. Coals are not ſo readily kindled, but burn much longer; gun-powder, hemp and flax ought to be kept by themſelves; gun-powder, when not in a large quantity, might be kept in a garret, the other articles in a cellar by themſelves; but care ſhould be taken to go as little near them by candle-light as poſſible. If perſons had time to take away theſe articles when a fire breaks out, it might be of great ſervice; but oftentimes they are ſo much employed in carrying away furniture, *&c.* that they neglect the fire, and do not uſe the proper means to extinguiſh it. However, people ſhould be left to their own prudence, to act as they think beſt for their own intereſt in theſe awful moments.

SECTION III.

THE *third* obſervation is, When once fire begins to burn with violence, the more that it is confined, the more it ſpreads, and burns with the greater rapidity.

It is the buſineſs of all concerned when a fire happens, to uſe their utmoſt endeavours at firſt to extinguiſh it, or prevent it from increaſing, by throwing on water, earth, or any thing elſe, that can be thought of to damp and ſmother it; but after uſing every poſſible means, the fire often prevails and ſpreads throughout the whole building. In that caſe, if there be no hopes of ſaving the houſe, every one ſhould ſtrive to prevent the fire from ſpreading to the next. The firſt thing I would recommend, is, by all means, to get off the roof in order to give the fire vent upwards to prevent it from ſpreading. The moſt ſpeedy way is, by throwing into the garret ſtorey ſome balls for the purpoſe, made up in a particular way, which will either blow out the fire altogether, or carry off the roof with very little danger. I once ſaw this happen accidentally in a houſe that was on fire in Perth, in a narrow ſtreet, not above twenty feet wide, where ſome houſes were behind the one that was burning at no more than ſeven feet diſtance, and others were cloſe upon each gavel. The whole houſe was on fire, and burned with great fury; the flames were ſpreading very much, and had taken hold of four houſes at once, when, all of a ſudden, the exploſion of ſome gun-powder that was in the garret ſtorey blew off the roof, which, to the great ſurpriſe of all the ſpectators, fell directly into the houſe, and not one perſon was hurt. This damped the fire, and prevented it from ſpreading, ſo that this accident ſaved a great number of houſes, which would, in all probability, have been burnt; for, at that time, there was only one water-engine in the town, which would have done little or no ſervice, as the houſes were ſo cloſe together, and ran in different directions. I was at the water-engine when the powder went off; and the fire was ſo rapid, that a poor man periſhed in it, as there was not time to get him out, the fire happening in the middle of the night. This convinced me that gun-powder may be of great ſervice when a fire is raging to an extraordinary height, and cannot be got under. Gun-powder is not ſo dangerous when thrown into the garret ſtory, or on the top of a raging fire as people may imagine. If the powder were to be put below the fire in the bottom of the houſe, in that caſe it would be dangerous; but a few balls thrown on the top of a fire tend rather to blow out the fire, and, for a time, to ſtop its rage. Were a few balls to be uſed conſtantly, and a little water or earth thrown in after them, it would have ſurpriſing effects, even in a corn-yard when on fire. When a fire is confined, it is ſurpriſing to ſee how high it will go, and how far it will ſpread. A ſingle buſhel of coals, when confined in an air, or reverberating furnace, will go about an hundred feet high; in proportion to the height of the ſtalk of the furnace, ſo is the draught of air which will carry the flame above the top of the vent. This you will always ſee at night, when the reverberating furnace is going, although the ſtalk be very high, whereas, were this buſhel of coals burning in the open air, the flame would not go above ten feet high; which ſhows, that, when fire is raging at its utmoſt ſtrength, it will go very high and ſpread very far if it be confined. Therefore, every method ought to be taken to prevent the fire from ſpreading, by ſmothering and damping it with earth, and throwing in balls made for the purpoſe; and, if all this will not do, though there is all the reaſon in the world to think that it will be ſucceſsful, yet, if the fire ſtill prevails, then let every method be uſed to take off the roof. If the wind be ſtrong, ſo as to blow the flame to the next houſes, or it is feared that it cannot be prevented, it is beſt to uncover the roof of the next houſe, by cutting down the couples, and laying the whole floor over with a foot thick of earth, and water above it, which will prevent the fire from having any effect. Perſons ought not to wait till the fire takes hold of the next houſe, when they have no time to do any thing to purpoſe; whenever they ſee it next to certain, that the fire is in danger of taking hold of that houſe, then is the time for uſing every method to prevent it. When there is a number of brick houſes, as in London, when oftentimes they cannot get the fire ſtopt from communicating or ſpreading, the walls or partitions being but thin, the beſt way would be to take down the next houſe, either in whole or in part, if earth cannot be got to lay on the flat of the houſe next the fire.

SECTION IV.

THE *fourth* obſervation was, That a great body of fire burns with much more fury than a ſmall; or, in other words, the rapidity of the fire is in proportion to the ſize of the body, the degree of confinement, and the quality of the fuel. A great body of fire burns with great fury when it has a great quantity of fuel and nothing to interupt it. Fire is of a catching nature; one fire naturally draws to another if it is within its reach; and, it is a common ſaying, It is hard when two fires meet. If a ſmall fire burns with great fury when confined, a great one in the ſame ſituation muſt burn with greater violence, and of conſequence have a greater heat, which makes the fire more readily communicate to the next houſes, both by raiſing ſuch a heat, as to dry the wood near it ſo much, that it becomes like tinder; and likewiſe, by communicating this great heat through the brick-walls, when not very thick. As the flâme of a great fire too muſt be greater than a ſmall one, it is often blown with the wind to the next houſes; for even when one would think there is little wind, the fire draws the air to itſelf.

Therefore, it is the buſineſs of all concerned to keep the fire in as ſmall a body as is poſſible, by taking every method for ſmothering and dividing it as before recommended.

SECTION V.

The *fifth* obſervation was, the more you can divide a fire, the more eaſily you can ſtop its progreſs. Fire loves to be united; its ſtrength lies in its union, and the more a fire is confined when once in its ſtrength, this tends to unite it the more, and make it burn with the greater velocity. Therefore, whatever methods a perſon takes to divide a fire, whether by ſmothering, throwing any thing upon it to damp it, or tearing aſunder the part inflamed, will tend to ſtop its progreſs. It often happens, that perſons cannot get near a fire when it is burning with great violence, in order to throw a ſufficient quantity of earth upon it: This need not hinder them from attempting to the utmoſt of their power to divide the fire, by tearing the part affected aſunder, and then attempting to ſmother it. Perſons may ſee this partly exemplified, ſitting in their own room: Let a fire in the grate be ever ſo ſtrong, only putting a few ſtones in the heart of it will ſoon break the union of the fire, and in a ſhort time make it go out. This is often ſeen when the coals are bad, and many ſtones amongſt them, that it is very difficult to make a fire burn at all: Moſt people know how to damp a fire by throwing upon it a little wet ſmall coal, or earth, with water, which will put it out altogether; lime with water is ſtill more effectual. The ſame things that extinguiſh a ſmall fire will extinguiſh a large one, if the materials be applied in proportion to the ſize of the fire. Is it not ſtrange then, that perſons never think of applying theſe ſimple things that would at leaſt ſtop the progreſs of the fire, if not extinguiſh it altogether, even without water, when it cannot be had? How often will you ſee a great number of perſons ſtanding idle looking at a fire, doing nothing, only tending to confuſe thoſe who are working with their noiſe. If every perſon that had it not in his power to do any thing elſe, were to be employed in throwing of ſtones or bricks into the fire, this would help much to divide it; and, if this were done, a great number of people, in a little time, would throw in a very great quantity of ſtones, ſo much as it would very ſoon have a ſurpriſing effect in dividing and ſtopping its progreſs. The very weight of them would help to keep the fire down from burning with great vehemence. The laſt reſource, when all other things fail, is, balls made up of different ſizes, the ſmall ones to be thrown into the fire in the under part of the houſe, the larger ones in the upper part. Theſe balls might be made up with printed directions, and ſold, and they could be thrown into the fire as ſafely as ſo many apples, as they would not go off inſtantly, but leave the perſon always time to retire; and they would be of very great ſervice, for, although they did not blow out the fire altogether, they would at leaſt ſtop its rapidity till ſuch time as there could be either water or earth thrown upon it. Perſons might begin with the ſmall balls at firſt, and continue with the large ones till they ſaw what effect it had. If this were once put in practice, perſons might in a ſhort time, come to know, what ſize of a ball would have the effect; and I ſhould not wonder to ſee the greateſt fire inſtantly put out by theſe balls. It is often practiſed when a vent is on fire, to diſcharge a gun up the vent, which inſtantly puts out the flame, and it is as reaſonable to think that a ball will blow out the fire for a little time, if not altogether: When confined in ſmall bounds, the exploſion is ſo ſudden that it blows out the fire. I remember, ſome years ago, that a perſon undertook to extinguiſh a fire both at London and at Edinburgh, after the room, or houſe, was all in flames, by throwing ſome balls into the fire, which inſtantly put it out. The great matter is, to recommend things that are eaſily got and at hand, ſuch as every perſon can apply. What would it ſignify though one were ſure, that ſuch a compoſition would inſtantly put out a fire if it were at ſome miles diſtance; or part of the materials were in one place, and part in another; or if, when got, they were very expenſive, and could not be purchaſed by poor people?

The newſpapers ſay, that, at the laſt great fire in Alderſgate, London, they had not water for above half an hour, and it was ſome time after they arrived, before they got the engines to play. If they had made uſe of the materials that I formerly recommended, they might have at leaſt retarded the progreſs of the fire till ſuch time as they had got water, or even extinguiſhed it altogether before the water came.

When the great fire happened in the Lawn-market of Edinburgh ſome years ago, it began in the garret ſtorey; it is more than probable, if they had followed the ſcheme here recommended of throwing ſome balls into the fire, they would, if they did not wholly blow out the fire, at leaſt have ſtopt its progreſs, till ſuch time as they laid the flat next the fire all over with earth and water above it, which would have prevented the fire from going any further. If the perſons concerned ſaw that they had not time to get the flat covered immediately below the fire, in that caſe, their buſineſs was, to go to the ſecond flat below, where ſurely they would have had as much time as to break down the partitions and throw them out of the windows, and get the flat all covered over with earth and water above it. This would not have hindered them from uſing all the other means to put out the fire, by throwing in balls wherever the fire was. By this means, there would have been four, if not five ſtories of that tenement ſaved, as I am informed there were ſeven ſtories of it altogether.—I think with fifty men I could have undertaken to have ſaved them.

Thus have I endeavoured, and, I hope, not altogether without ſucceſs, to convince my fellow-citizens, that the general opinion, and the general practice of extinguiſhing fire by water, is entirely a prejudice, by no means to be indulged, as it tends to ſtop our inquiry after methods more eaſy in their application, and far more effectual in their event. I have alſo taken the liberty of ſuggeſting ſome of the methods which have occurred to me as likely to produce the happieſt effects in extinguiſhing fire. The principle upon which theſe methods proceed, is ſo ſelf-evident, that I have troubled the public with little illuſtration of it. That fire will not burn without air, is a fact which the daily experience of every individual muſt convince them of. I have endeavoured alſo to point out the application of this principle to the particular caſes which moſt commonly occur. And this was all I could do; for it being impoſſible to figure all the different ſituations in which fire may be, ſo it is impoſſible to give directions how every one of theſe particular caſes ought to be treated. A perſon who writes for the general utility can only lay open the principle upon which his reaſonings proceed, and he muſt always leave the particular application of them to the parties concerned in the particular caſes where they ought to be applied.

The ſame apology may may be made for the generality of the directions which have thought proper to give with regard to the removing from the ſubject in fire every thing that may tend to encreaſe the flame, as well as to the generality of directions which I have given for managing the ſubjects on fire.

I now come to the laſt thing propoſed, *viz.* To give ſome directions and rules to perſons employed in extinguiſhing fire. Every thing depends on the method, regularity, and compoſure of the perſons employed on theſe occaſions. Where method and regularity are wanting, nothing can either be done properly or ſpeedily; confuſion, buſtle, and haſty procedure never fail to retard the progreſs of buſineſs of any kind, but more eſpecially of that alarming kind where people naturally are apt to be confuſed, and quite at a loſs how to act.

It ought, therefore, to be the grand object of magiſtrates in all cities, eſpecially thoſe where fires frequently happen, to have a certain ſet of perſons appointed for the purpoſe of giving their aſſiſtance in extinguiſhing fire. Theſe men ought to be particularly well inſtructed in the principles upon which they are to proceed, and the objects which they are to have in view when the fire happens.

It is from ignorance and uncertainty of what is to be done in alarming events, that mankind are confuſed about the part which they are to act upon theſe occaſions. This is the cauſe of that great diſtraction and fooliſh procedure which we almoſt always ſee upon occaſions of this kind. To remove this, the moſt effectual method muſt ſurely be that which I have propoſed.

A certain ſet of men, appointed for the purpoſe, being inſtructed in the principles upon which they are to act, and being alſo trained up in the application of theſe principles to practice, experience will at laſt teach them to act with the ſame deliberation, ſteadineſs, and effect as they would do upon any common occaſion.

While I ſpeak of training men to the application of the methods that may be thought moſt proper for extinguiſhing fire, I mean, that their general object ought firſt to be explained to them, and then the particular duty of each individual ought to be plainly and diſtinctly laid down to him, ſo that when he comes into action, he may have nothing to confuſe him, nothing to employ his thoughts and attention but that one ſingle object. Were men once trained in ſuch a manner as this, we ſhould ſee the buſineſs of extinguiſhing fire carried on with the ſame compoſure and deliberation as any other ordinary piece of buſineſs; and, were that once the caſe, we ſhould ſoon ſee very happy conſequences ariſe from it, as I have no doubt in affirming, that it is by indiſcretion, confuſion, and improper interference, that many fires are allowed to get ſuch a length as to occaſion the deſolations which ſometimes happen. Having ſaid ſo much in general, upon the conduct of thoſe perſons who are to be employed in extinguiſhing fire, I have only to add a few particular Rules, which, I think, may be followed with ſucceſs upon theſe occaſions.

Firſt, then, I think in every city, there might be a certain number of work-people choſen for the purpoſe of extinguiſhing fire when the occaſion requires. Theſe perſons might get a certain annual gratuity, and beſides that, when in actual employment, might be allowed certain wages for their trouble. They might be divided into different claſſes, ſo that, upon occaſion of a fire, when they are called to give their aſſiſtance, they might be at no loſs what they are to do, as their particular buſineſs would be thus aſcertained.

DIRECTIONS for Perſons employed in extinguiſhing Fire.

WHEN a fire appears at firſt, then is the time for perſons concerned to exert themſelves; for a blunder here has often proved very fatal both to thoſe immediately concerned, and others in the neighbourhood, ſometimes it happens for want of thought, the people being ſo much alarmed at the ſight of fire, as almoſt to turn quite ſtupid. The great matter, is, to think a little and deliberate, before acting, what ſhall be done to extinguiſh this fire, and what is neareſt at hand for ſo doing; then inſtantly to act with courage and reſolution, not to ſtand gazing at the fire, but to uſe every means they can think of to check it. It is hard to ſay what people ſhould do at firſt; it much depends upon what progreſs the fire has made: If new begun, ſo that it might be ſoon extinguiſhed with what is neareſt at hand, perhaps at this time a wet or a dry blanket, or clothes of any kind will anſwer for ſmothering it. When there is but very little water at hand which is often the caſe at firſt when fire begins, it had need to be uſed very frugally by mixing it with earth or aſhes, or dipping clothes of any kind into it in order to ſmother the fire.

I am very ſenſible, it is much eaſier to give directions than to get them executed when an occaſion of fire happens. Regularity, however, ought to be tried as much as the nature of the thing will allow. The perſons employed might be divided into five claſſes. The firſt, and not the leaſt neceſſary claſs, ought to conſiſt of thoſe who ſhould have the direction of all the reſt. Let ſix knowing men be fixed upon as directors, for a great number would only breed confuſion.

A great number of perſons at a fire reſembles a field of battle, at firſt they are much frightened, in a little time, when employed, this fear wears off.

What would an army do without commanders ? they would all go into confuſion. So is the caſe at moſt fires ; the confuſion is ſo great, that every one is a director ; one giving this order, and another quite contrary; whereas, were perſons to conduct themſelves in a more regular manner, they might have a proſpect of doing more ſervice with a tenth part of the hands, and a tenth part of water, when mixed with earth or other materials. Were theſe ſix men to have the ſole power to give orders, and to make it their only buſineſs to go about and carefully obſerve what progreſs the fire is making, and what is moſt neceſſary to be done; and to give orders for the engines to play where the water is moſt needed, and where to apply earth or materials; at the ſame time, never to let the water hinder the applying earth, nor the earth the water, and to uſe balls when the fire is in any degree violent, in ſmaller or greater quantities, as they might ſee occaſion. By uſing theſe three articles with judgment and caution, they might ſoon get the better of a very ſtrong fire.

What I would *firſt* recommend to their particular attention is to try to ſmother the fire with earth and water, or other materials formerly mentioned. If that cannot be effected,

In the *ſecond* place, to try to divide the fire by breaking down the partitions, if affected with fire, or whatever part is affected, to try to break, tear, or ſcatter the part in flames, and to draw as much to them as poſſibly lies in their power, and then to attempt ſmothering it.

In the *third* place, if they cannot get at the fire, to break or divide it, it being ſo violent; in that caſe, let them throw ſome of the balls into the fire, whatever ſituation the fire be in, whether below, above, or in the middle. If below, or in the middle of the houſe, they may uſe the ſmall balls; but often, if in the upper ſtorey, the large balls may be uſed, always throwing ſome earth after the balls, if it can be got, and water after that, and never loſe an opportunity to divide the fire when it can be obtained.

Fourthly, If the fire is in the ground flat of the houſe, if the ſituation that the fire is in will admit of it, they may lift ſome deals of the floor above, in order to throw down earth and water upon the fire; but by no means ſhould they ever attempt to raiſe a deal till ſuch time as they have plenty of earth and water at hand to throw down. If they have plenty of earth and water, they need not mind how much of the floor they raiſe, as the earth and water will ſoon extinguiſh it below; if that cannot be done, throw as much earth and water on the floor above as can conveniently be got, at the ſame time throwing earth and water upon the fire below, with balls, when the fire is violent, and they cannot go near it. Let them remember never to leave any furniture or wooden partitions ſtanding if they can be knocked down, and to throw them out of the windows, as they increaſe the flame.

Fifthly, If the fire happens in any of the middle ſtories above, uſe the ſame precaution as before directed.

Sixthly, If it begins in the garret ſtorey, the balls and water is the only thing that can be uſed, which, if plenty of both be uſed, may extinguiſh the fire; but if the fire prevail after theſe means are uſed, in that caſe every means ſhould be attempted to ſave the ſtorey below, by knocking down the partitions, throwing them out at the windows with all the wooden furniture, and then to lay over the floor with earth and water, as was formerly mentioned.

Seventhly, If the whole houſe be in flames, and there is little proſpect of the water or earth bringing it under, in that caſe the balls are the only thing that can be of ſervice to ſtop its progreſs ; and every means ſhould be uſed for the preſervation of the houſes next, as formerly mentioned. Each of the directors ought to have a ſmall ſpeaking trumpet in his hand, and a long pole, with a hook on the one end of it, and a ſtrong pike on the other, with a ſtrong leather cap, to ſave the ſlates or ſtones falling down from hurting his head. This would let them be known to the multitude ; and if any had orders to give, they might give it to the directors.

A *ſecond* claſs, if it can be got, ought to conſiſt of ſmiths, wrights, maſons, and ſlaters. Theſe ought to come always to the fire with their tools, and their buſineſs ſhould be wholly confined to go along with the directors, and at firſt to divide and break down the partitions, or whatever is affected with the fire which they cannot get at to ſmother. After they do this, they are to leave the ſmothering to the third ſet, and to have no further concern, but to go to the ſtorey, either above or below, and to take out the windows, and remove the furniture and partitions, and throw them out at the windows, to make the floors ready for the fifth ſet to lay on the earth. After that is done, if there be a neceſſity of taking off the roof, they may immediately proceed to do that. It is eaſy to ſee what inſtruments they would require for theſe purpoſes, ſuch as all theſe tradeſmen uſe; the only things they would require beſides are long poles, ſome with hooks, the ſame as are uſed on board of ſhips for wood in the water, commonly called booms, others with broad chiſſels for cutting, ſuch as they prune the trees with, others for breaking down any partitions or part affected with fire.

A *third* claſs ought alſo to be provided; one part of them to be employed in working the water-engine, and another part to be uſing every means in their power for extinguiſhing the fire, by throwing on the water by the hand, or mixed with earth and other materials before recommended, and to throw in the balls when the fire is violent, and to draw as much of the wood of the partitions as they can, in order to ſmother it with earth and water, which, if uſed in plenty, will ſurely have the effect. This ſet to be provided with every thing that can be thought uſeful for them, ſuch as buckets for the water, ſpades and ſhovels for the earth, corn or hay-forks for throwing the wet ſtraw, when firſt required, light wooden ſhovels with long handles, a good number of long poles with woolen cloths fixed on the end or mops, ſuch as the bakers have for their ovens; for, as when a fire happens in the roof or ſide walls of a houſe, the water has little impreſſion, ſince it runs off, theſe woolen cloths or mops, dipped in water, might be of great uſe, when the fire is only begun, and not far advanced, by holding the wet cloths a little time to the place on fire; and as they would not take fire for a little time, they would tend to ſmother the fire by being repeated one after another. They ought likeways to be provided with hammers, and axes, and long poles with iron on the ends in different ſhapes, as deſcribed for the laſt claſs; ſome to break, others to cut, and others to pull the wood ſo broken to them, or ſcatter it from the fire in the houſe.

A *fourth* claſs, is, to carry water for the engines, for mixing with earth, and other materials, as formerly mentioned. The water ſpilled from the engine, mixed with the earth on the ſtreet, is better for throwing on a fire, than the clean water, and all the rubbiſh that can be got from the ſtreet, ſhould be mixed in with what is thrown by the hand.

A *fifth* claſs, is, to carry earth, ſand, lime, ſtones, horſe dung, or ſtraw and hay at the beginning if needed. This to be layed down to the third ſets, and this claſs ought to do no more excepting in caſes where there is occaſion for carrying it up ſtairs and laying it down on the floor; this claſs would require pick-axes and ſpades for digging the earth whereever they can get it neareſt at hand. If not got near, to dig holes in the ſtreet. If earth be needed for the ground-flat, it may be carried in carts or wheel-barrows, and if up ſtaiss, may be carried in ſhort and wide bags, creils, or baſkets, or any other thing neareſt at hand. This ſet to be conſtantly employed at this, and to be doing nothing elſe.

Theſe directions attended to, would, it is humbly imagined, prevent all confuſion and embarraſſment; every man would know his duty and might execute it without interfering with another; if any thing occurred to difficult him, the directors are at hand to give him his orders. Thus would every thing go on in the ſame order, and be executed with the ſame punctuality as is done in ordinary occurrences in buſineſs; and, by that means, would that confuſion which attends ſcenes of this kind, and which helps in a great meaſure to hinder the fatal effects from being prevented, be totally avoided.

APPENDIX.

THERE are ſeveral gentlemen that have very much approved of the method of throwing on earth, and mentioned ſeveral inſtances wherein they have uſed it themſelves with great ſucceſs, particularly one gentleman very eminent for his extenſive knowledge in many ſciences approved of it; he told me, that he happened to be at Leith one time when there was a fire in a malt loft or brewerie: There was ſome bran in a corner of a loft that they were carrying of, which, at this gentleman's particular deſire, they took and mixed with water and threw upon the fire, and it immediately extinguiſhed it: This ſhows, that bran had the effect, and earth would have ſtill been better. Another gentlemen from Leven, told me, that a lint-mill being on fire, at his deſire they threw earth upon the lint ſtacks that were cloſe by the mill, which prevented the fire from catching hold, and extinguiſhed any part that had been ſeized.

Another told me, that when a fire happened at Canonmills, notwithſtanding they had all the water at command, it would not have been in their power to have prevented the fire from ſpreading, if they had not uſed earth and turf or divots, which prevented it effectually from communicating to the next mill, and the ſervices of the perſon who directed this were gratefully acknowledged by the people concerned. Many more inſtances could be given, but theſe may ſuffice at the time: Only let perſons try the directions formerly given, and then they will know from their own experience, the good effects of applying the materials herein recommended. Some of theſe directions might be uſeful at ſea; particularly, the Newcaſtle coal when mixed with water would have the ſame effect as earth; taking a ſail and putting it into the ſea and throwing it upon the fire, repeating this ſeveral times might be of great ſervice, and if the fire is violent, to throw in ſome of the ſmall fire balls, which every ſhip-maſter ought to have along with him; if they have not them, to take a ſmall quantity of gunpowder and wrap it up in ſome folds of paper, and throw into the top of the fire, and water immediately to be uſed after that: If the fire continues, ſtill to throw in another ball or gun-powder. Theſe balls, with printed directions, may be got from the Author at Perth, or at Mr William Fraſer's ſhop, Luckenbooths Edinburgh, or any other perſons houſes that may be advertiſed afterwards. As theſe balls are but a ſmall expence, wherever there is a water engine, there ought to be a number of them lying there of different ſizes, for it is not time to ſeek even gun-powder itſelf when a fire happens, and in the confuſion that people are in, going near gun-powder by candle-light, accidents might happen. There is one thing I would particularly recommend, which is to be ſure to put theſe balls into the top of the fire, for if they were thrown to a ſide, and did not go off, they might be of danger when perſons were clearing out the rubbiſh. I am of opinion, that theſe balls might be of great uſe to every individual, therefore, a great number of them circulated in different places might be of great ſervice upon ſome occaſions.

FINIS.